Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Non-perturbative Quantification of Ionic Charge Transfer through Nm-Scale Protein Pores Using Graphene Microelectrodes[1] JINGLEI PING, A. T. CHARLIE JOHNSON, University of Pennsylvania, A. T. CHARLIE JOHNSON TEAM — Conventional electrical methods for detecting charge transfer through protein pores perturb the electrostatic condition of the solution and chemical reactivity of the pore, and are not suitable to be used for complex biofluids. We developed a non-perturbative methodology (˜fW input power) for quantifying trans-pore electrical current and detecting the pore status (i.e., open vs. closes) via graphene microelectrodes. Ferritin was used as a model protein featuring a large interior compartment, well-separated from the exterior solution with discrete pores as charge commuting channels. The charge flowing through the ferritin pores transfers into the graphene microelectrode and is recorded by an electrometer. In this example, our methodology enables the quantification of an inorganic nanoparticle–protein nanopore interaction in complex biofluids.

[1]The authors acknowledge the support from the Defense Advanced Research Projects Agency (DARPA) and the U.S. Army Research Office under grant number W911NF1010093.

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Date submitted: 10 Nov 2016 Electronic form version 1.4